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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,749	12/11/2003	Haoren Zhuang	14580-045001 / FP2078	9525

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FISH & RICHARDSON, PC  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

EXAMINER
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CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
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1756

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/734,749

Applicant(s)

ZHUANG, HAOREN

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 12-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 12-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/06</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. Claim 19, is objected to because of the following informalities: Claim 19, at line 2, recites "a one-step tech from the top electrode to the bottom electrode". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-7, 12, 14-17, and 18-19, are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 6,051,858 (Uchida et al., hereinafter referred to as Uchida).

Uchida, in the abstract, in col 2, lines 33-38, col 14, lines 46-67, in col 15, lines 1-48, in col 22, lines 34-64, discloses a method of forming a patterned hard mask on a ferroelectric capacitor includes forming a photosensitive solution of a sol-gel layer (metal precursor complex) on the capacitor device (ferroelectric capacitor), forming a pattern on the sol-gel layer, and developing the exposed sol-gel layer (etching or removing in an etchant the non-exposed part of the precursor layer to form the negative pattern, patterning the sol-gel layer photolithographically) heating the patterned sol-gel layer (patterned liquid coated precursor, patterned protective layer) in a nitrogen atmosphere to form a metal nitride mask pattern (titanium nitride mask) (claims 1-2, 12). Uchida, in col 14, lines 46-67, in col 15, lines 1-48, discloses that the sol-gel layer

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includes a titanium organic sol gel layer (metal-organic complex layer or metal alkoxide in an organic precursor), wherein the organic group is an ethyl acac, the metal includes titanium or metal alkoxides (claims 3, and 5-7). Uchida, in col 18, lines 50-56, discloses that the sol-gel layer is spin coated onto the device (claim 14). Uchida, in col 7, lines in col 13, lines 40-46, and in col 14, lines 24-56, discloses that the patterned mask (protective layer mask, hard mask) is used to ion mill the device beneath, and that the device is a FeRAM capacitor (claims 15-17). Uchida, in col 4, lines 23-54, in col 26, lines 14-60, discloses that the photosensitive sol-gel layer is formed on either the bottom electrode or the top electrode of the capacitor (claim 18). Uchida, in col 23, lines 15-26, discloses that an etching process can be performed (one-step etching) from the top electrode layer through the dielectric and to the bottom electrode (claim 19).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, and 13, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,051,858 (Uchida et al., hereinafter referred to as Uchida) in view of U. S. Patent Application Publication No. 2004/0164293 (Maloney et al., hereinafter referred to as Maloney).

Uchida is discussed in paragraph no. 2.

The difference between the claims and Uchida is that Uchida does not disclose that the photosensitive sol-gel layer is a titanium-aluminum organic sol-gel layer (claim 4). Uchida does not disclose that the converted patterned protective nitride layer includes Ti-Al as the metallic part of the metallic nitride material (claim 13).

Maloney, in [0107], [0144], [0145], [0146], [0147], discloses that the hard mask layer is a photosensitive sol-gel layer comprising a metal complex precursor of the claimed composition (including plural metallic (Ti-Al) organic precursor compositions).

Therefore, it would be obvious to a skilled artisan to modify Uchida by employing the photosensitive sol-gel composition suggested by Maloney because Maloney, in [0173], discloses that employing the photosensitive (metal precursor) sol-gel layer as the hard mask layer enables low temperature processing and a four-fold reduction in carbon residues.

### ***Response to Arguments***

6. Applicant's arguments filed December 15, 2006, have been fully considered but they are not persuasive. The 102 and 103 rejections made in the previous office action are maintained.

A) Applicants argue that search classification data of the Uchida and Maloney is not related to the search classes of the present application.

The references viz., Uchida and Maloney are applied in the present application for its disclosure of a capacitor fabrication that includes forming a hard mask on the capacitor. The references are not applied based on its classification.

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B) Applicants argue that Uchida does not disclose forming a photosensitive sol-gel to a capacitor.

Uchida, teaches using a photosensitive sol-gel solution to form a photosensitive sol-gel layer on a top electrode or a bottom electrode of a capacitor (See column 15, lines 1-49, and in col 26, lines 15-56).

C) Applicants argue that Uchida does not teach applying a nitrogen thermal decomposition treatment.

Uchida, in col 2, lines 33-67, and in col 4, line 26-54, in col 18, lines 50-67, in col 19, lines 39-55, discloses that photosensitive solution that comprises the protective layer (and applied to the electrode of the capacitor) can be nitridated (reduced by the forming gas) and annealed (in a rapid thermal processing apparatus) to form a mask pattern (hard mask). Therefore Uchida does teach a nitrogen thermal decomposition treatment.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

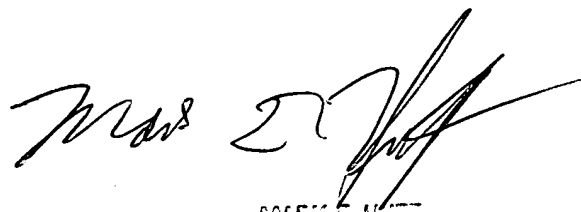
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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

March 1, 2007.



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